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SCIENCE NEWS LETTER

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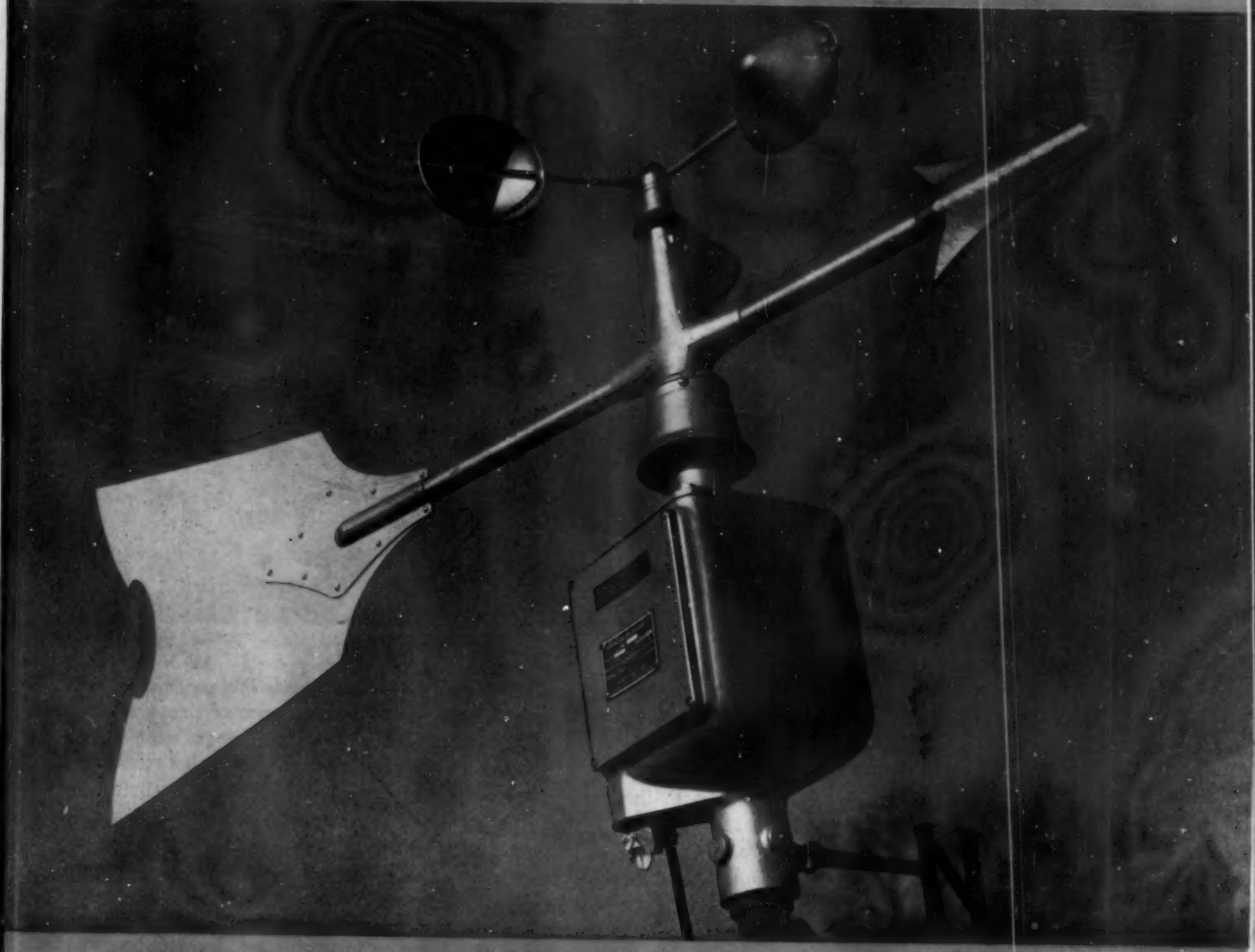

Inanimate Observers

See Page 298

A SCIENCE SERVICE PUBLICATION

YOUR TELEPHONE TRANSMITTER AND RECEIVER, *voice gateways to the telephone plant, are so essential to satisfactory service that they have been under study in Bell laboratories for seven decades.*

A TELEPHONE RECEIVER is a complex system of electrical and mechanical elements. Its coils, magnets, diaphragm and cap react on each other as they convert the electrical waves of your voice to sound waves. What is the best size for the holes in the ear cap? Will 1/1000th inch greater thickness help a receiver diaphragm to carry your telephone voice more clearly? One way to find out is to build numerous experimental receivers and test them.

But Bell Laboratories have found a shorter way. They built an all-electrical replica, an "equivalent circuit" in which electrical resistance stands for air friction in the cap holes; capacitance corresponds inversely to the stiffness of the diaphragm. Performance of this circuit can be quickly measured and design changes economically explored. Later, a model can be built and checked.

The "equivalent circuit" was pioneered by Bell Telephone Laboratories 25 years ago. It is a useful tool in many Laboratories developments—saving time, saving the cost of machine-tooled models, encouraging experimentation. It is one more example of the way Bell scientists get down to fundamentals as telephone progress continues —and service keeps on improving for all subscribers.

BELL TELEPHONE LABORATORIES

EXPLORING AND INVENTING, DEVISING AND PERFECTING, FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

MEDICINE

New Mold Remedy Found

Chloromycetin from soil belongs to the penicillin-streptomycin family. It is effective against the typhus and spotted fever group as well as parrot fever in lab tests.

➤ A NEW streptomycin-like remedy from a mold has been dug out of the earth. Epidemic typhus fever, Rocky Mountain spotted fever, scrub typhus and parrot fever, or psittacosis, are among the serious diseases which may be conquered by this newest member of the penicillin-streptomycin family of drugs.

Chloromycetin is its name. It was discovered by Dr. Paul Burkholder of Yale University in a sample of soil from a mulched field near Caracas, Venezuela. The sample of earth was one of hundreds collected from all over the world in a search for molds and fungi that might yield disease remedies.

Discovery of chloromycetin and preliminary tests of it are reported by Dr. Burkholder and Drs. John Ehrlich, Quentin R. Bartz, Robert M. Smith and Dwight A. Joslyn, of Parke, Davis and Co. Research Laboratories in the journal, *Science*, (Oct. 31).

Its effectiveness against the typhus and spotted fever group and parrot fever discovered by Drs. J. E. Smadel and E. B. Jackson at the Army Medical Department Research and Graduate School, Washington, is reported in the same scientific journal.

The Army studies were made with infected chick embryos and mice. Tests on patients have not yet been made and may not be completed for a year. Further lengthy and careful tests on laboratory animals must come first to learn whether chloromycetin is safe or too poisonous to give patients. Then enough of the chemical must be extracted from its earth mold producer to treat patients on a trial basis.

So far, the chemical seems safe. Large doses did not harm the mice and it could be given them either by mouth or by hypodermic injection. Excellent results were obtained even when the chemical was given as long as 10 days after mice had been infected with the typhus fever germs.

Rickettsialpox, a new disease discovered in New York last year, may also be treated successfully by chloromycetin, the Army laboratory studies suggest.

The good results in parrot fever are impressive because this disease is caused by a virus and virus diseases, from the common cold to infantile paralysis, have been practically untouched by mold remedies or other chemicals. Chloromycetin was tried in mice with another virus disease, Japanese encephalitis, a kind of so-called sleeping sickness. It was not effective. Nor did it stop influenza A virus in chick embryos. It was also ineffective against smallpox virus in fertile hen's eggs.

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NUCLEAR PHYSICS

Rare Isotope of Helium Can Now Be Concentrated

➤ A RARE form of helium can now be concentrated by a single-step process, Ohio State University has revealed. It is a process carried out at a temperature some 450 degrees below zero Fahrenheit at which ordinary liquid helium takes on some peculiar properties.

Helium is the exclusively American non-combustible gas used in balloons. It is extracted from natural gas in Texas and New Mexico. The newly concentrated form is the mass 3 isotope of the substance, which exists normally in the proportion of only one part to a million of the normal mass 4 isotope. Isotopes are forms of the same element which differ in mass but are ordinarily identical in other characteristics.

At extremely low temperature, down close to absolute zero which is approximately minus 460 degrees Fahrenheit, liquid helium has the ability to climb up the walls of its container. The single-step process depends on this property. The ordinary mass 4 isotope climbs, the mass 3 isotope remains behind, thus becoming concentrated.

The discovery was made by Drs. J. G. Daunt, R. E. Probst and H. L. Johnston, of the university staff, working on a helium project for the Office of Naval Research. The new process will probably be of value in the nuclear field.

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***JUDGING ENTRIES**—How the winners were picked for the Photography in Science Exhibition being held at the Smithsonian Institution Nov. 1-30. Its purpose is to extend the possibilities for developing photography as a basic tool in research and teaching.* [*See pages 294 and 295.*]

GENETICS

Mendel Shrine Wrecked

One bomb destroyed a part of the monastery in Brno, Czechoslovakia, where priceless mementoes of the great geneticist were kept.

➤ ONE SHELL—whether German or Russian nobody knows—made a wreck of the Mendel shrine in the monastery in Brno, Czechoslovakia, where priceless mementoes of the great geneticist were kept. Other, equally priceless Mendeliana, especially the manuscripts that were the foundation-stones of modern genetics, were stolen by the Nazis from the archives of the Natural History Society, before which Mendel first presented the results of his researches. It is known that these were paraded around Germany, but what has become of them has not yet been found out.

This story of disaster to the relics of Gregor Mendel is told in the *Journal of Heredity* by Hugh Iltis, a science student at the University of Tennessee, who was for a time with the U. S. Army of Occupation in Germany. Mr. Iltis' father, Prof. Hugo Iltis of Mary Washington College, was a native of Brno, and has devoted years of study to the life and works of Mendel. So when opportunity offered, the younger Iltis made a journey to Brno to see for himself what had happened to the city and to the monastery where Mendel had once raised his little garden of very important peas and where he subsequently ruled as abbot.

The city had been pretty severely battered during the last days of the war, though it is now patiently being rebuilt. At first sight nothing seemed amiss with the monastery, but Mr. Iltis soon learned otherwise. Only one shell had hit the entire large structure—but it had crashed right into the room where the Mendel shrine was housed, demolishing practically everything in it and leaving a large hole where wall and roof joined, through which the weather had wrought further mischief.

Elsewhere, both within and outside the monastery, things associated with Mendel were unharmed, save for the looting of the Natural History Society's headquarters. The beautiful white marble statue of the great geneticist that dominates city square dedicated to his memory remains unmarred. A pear tree and an apricot grafted on a plum, both of which Mendel is believed to have planted in the monastery grounds, were in full fruit. The little plot where he worked with his peas was bright with flowers.

The Nazis tried to make much of the German parentage of Gregor Mendel, states Mr. Iltis, even going to the length of issuing a postage stamp with his portrait on it. But he is sure that had Mendel been alive at the time he would have had none of these dubious honors. He feels quite convinced, on Mendel's known record as a stubborn defender of human dignity and rights, that he would have been another German prelate driven into exile or cast into a concentration camp.

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NUCLEAR PHYSICS

Mesotron Photographed

➤ ONE of the most elusive and mysterious of the subatomic particles, the mesotron (alias meson) has been photographed. The mesotron itself got away, for it lived only a fleet fraction of a second and then disintegrated into two other particles, one a well-known electron and the other either a photon (a glob of light) or a neutrino, a little neutral particle about which little is known.

A team of California Institute of Technology physicists, consisting of Drs. Carl D. Anderson (Nobelist), Raymond V. Adams, Paul E. Lloyd and R. Ronald Rau, report the photographic feat accomplished in a "cloud-chamber" device aboard a high-flying B-29 cruising nearly six miles above the earth.

The purpose of this sub-atomic photography, they explain in a report to the *American Physical Society*, (Oct. 15) is to discover the mass and the disintegration products of the mesotron, which is one of the many steps necessary in exploring the changes in matter and energy when cosmic rays bombard the earth. Mesotrons are created by the powerful cosmic rays and so far man-made radiation has not been powerful enough to duplicate the effect of the cosmic rays.

The Cal. Tech. photographs suggest that the incoming mesotron is about 200 times as massive as the familiar electron and that the neutral particle resulting from its disintegration has a mass 50 to 60 times that of the electron. There is also a hint that there may be neutrally uncharged mesotrons lurking about somewhere in the subatomic picture.

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The lubricating value of *oil* is due to its chemical structure and composition, not to its viscosity.

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MEDICINE

Mice May Help TB Fight

Their reactions to infection by tuberculosis germs help scientists to get a better idea of what happens to human victims of this still deadly plague.

➤ MICE may become mankind's most useful allies in the war against tuberculosis, Prof. Rene Dubos of the Rockefeller Institute for Medical Research declared in a lecture given in Baltimore before the Johns Hopkins University chapter of Sigma Xi.

Their reactions to infection by TB germs help scientists to get a better idea of what happens to human victims of this still deadly plague, with better hopes of eventually sending it into the limbo of once devastating but now nearly extinct diseases like smallpox and typhoid fever.

It has been discovered that mice have hereditary differences in their susceptibility to tuberculous infection. Since mouse lives are cheap, these little animals can be used freely in an effort to throw light on resistance and susceptibility in our own species.

"It has also been found that all strains of mice become more susceptible to tuberculosis as a result of a concomitant infection with the influenza virus, or following physiological disturbance caused, for example, by nutritional deficiencies," said Dr. Dubos. "This suggests that mouse tuberculosis, a disease well adapted to laboratory analysis, may serve as a useful tool for the study of human tuberculosis."

That tuberculosis does call for intensive study is well attested by the fact that it is still the greatest single cause of death in the 15-40 age group, despite a steady decline in its death rate for the past 75 years. Before that, there had apparently been a steep rise in TB mortality, perhaps connected with the crowding into cities of great masses of the ill-fed, ill-housed poor brought about by the Industrial Revolution. Gradual amelioration in the laboring population's living conditions has been credited with the falling off in the tubercular death rate.

Industrialization of tropical countries is just getting fairly under way, the speaker pointed out. Tuberculosis is still a very serious disease in the tropics, especially in Latin America; it will be necessary to gain a conqueror's knowledge of tuberculosis soon, if the tragic conditions of northern Europe and eastern America a century ago are not to be repeated in lower latitudes.

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ELECTRONICS

VT Fuze Creates Problem As Great as Atomic Bomb

➤ THE VT fuze, better known to laymen as the war-developed proximity fuze, poses problems to military field forces as difficult to solve as does the atomic bomb.

The statement is made by Lt. Col. F. P. Henderson, U.S.M.C., director of the Marine Field Artillery School at Quantico, Va., in *Ordnance,* (Nov.-Dec.) official publication of the Army Ordnance Association.

The VT fuze is a weapon of today, he says, and will be present on the battle fields of the future whether the atom bomb is there or not. This electronically operated fuze, used first in anti-aircraft warfare, is carried in the nose of a bomb or shell and is triggered to cause their explosion at the proper distance from the target by electric pulses which are sent out by it, and reflected back to it by the target.

If used by an enemy in a future conflict, the Colonel declares, the VT fuze will prove deadly to American troops for it will unfailingly detonate a shell at the optimum height above the target, thus nullifying the protection of the open foxhole or gun emplacement by spraying shell fragments into it.

"What we must provide," he continues, "is complete splinter-proof protection against VT fire from artillery, mortars, naval guns, or close-support aviation to all elements of a military force, whether it is defending or attacking. To provide this protection without hampering the mobility of troops will be one of the most knotty problems that science, industry, and the armed forces will be called upon to solve."

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ATOMIC POWER PLANT—The basic parts are shown in this model being inspected by Dr. Kenneth H. Kingdon. At the left is the atomic "pile" where matter is transformed into energy. The striped rods projecting horizontally represent the control rods which would prevent the process from running away. A heat exchanging fluid would be pumped through the pile, thence to the heat exchanger on the right, where water would be turned to steam.

MEDICINE-GENETICS

Fire Slows Cancer Study

The Jackson Memorial Laboratory which was destroyed at Bar Harbor, Me., supplied many laboratories with specially bred mice needed for cancer research.

➤ CANCER research will be slowed for years to come as a result of the disastrous fire at Bar Harbor, Me. The flames that burned millionaires' villas brought loss to the entire world when they destroyed the modest brick building that was the Roscoe B. Jackson Memorial Laboratory.

Cancer researchers in countless laboratories depended on the Jackson Laboratory for the specially bred mice needed to test possible cancer cures and to probe deeper for knowledge of the causes of cancer. The Jackson Laboratory was furnishing some 50,000 mice a month to other laboratories.

In this mouse metropolis of 100,000 or more inbred mice were some that always, generation after generation, developed cancer of the breast. Other strains had been bred to develop cancer of the lungs, of the ovaries, of the liver and of the adrenal glands. Mice of the same strains, fortunately, are living in other laboratories now and can be bred to produce more of the same strains. But it will be at least two years before there are anything like enough of them. Meanwhile, cancer research projects all over this country and perhaps in other parts of the world will be stopped for lack of mice.

Irreplaceable, if it has been destroyed, is the unique collection of mouse genes, said to be the best in the world, which had been collected in the Jackson Laboratory. This collection was being used to study the location of the genes, or units of heredity, involved in cancer.

The Jackson Laboratory, besides its place in cancer research, was known as the mammalian genetics center of the world. Material accumulated for 45 years may have been lost. Other laboratories, even if they bred mice, did not keep the genetic material they developed, letting all of it be housed in the Jackson Laboratory.

This laboratory has contributed more fundamental information on cancer than any other laboratory in the world, one authority has declared. It was here that the milk factor in breast cancer was discovered. This factor, believed to be a virus, is present in the mouse mother's milk and causes cancer in baby mice that suck the milk.

Here also were done fundamental studies on genetics, or inheritance; on the inheritance of size; on tumors of the adrenal glands which gave important information on the body's glands as well as on cancer.

Here transplantation of ovaries from one animal to another was first done and extensive studies made on transplantation of single eggs from the body of one mouse to another. If the animals in this study have been lost, it will be eight or ten years before the loss can be made up, because many of the animals are only now maturing and going on to the cancer age when they could give information for the fight against human cancer.

The Jackson Laboratory was founded by Dr. C. C. Little, its director, with money given by Mrs. Roscoe B. Jackson in honor of her husband, president of the Hudson Motor Co., who died of cancer.

One ray of hope is held by cancer researchers in the midst of their shock at the tragic loss to science and humanity in Bar Harbor. This is that someone may be inspired by the loss to give funds not only to rebuild the laboratory but to endow it so that it would be freed of the struggle for funds that has plagued it in the past.

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SUPER-BAZOOKA EXPLOSIONS ***—From hollow-ended charges in anti-submarine bombs they sent jets of flame to a height of 250 feet. These "hard" flames were each capable of piercing 23 inches of steel armor-plate, just as the jets from the much smaller charges in wartime bazooka projectiles could pierce the three or four inches of armor carried by a heavy tank. This photograph, which shows a group of these mines being fired simultaneously to test for mutual interference, won first prize in the color division of the first international competition in scientific photography. It was made by Dr. Thomas C. Poulter, associate director of the Armour Research Foundation.***

PHYSICS

New Instrument Measures Rocket Gas Temperature

➤ NEW instrument for "taking the temperature" of the exhaust flame of a rocket was revealed at the annual meeting of the Optical Society of America in Cincinnati.

The new instrument, called an absorption-emission pyrometer, will open up new research into rocket power by solving a difficult problem for scientists studying rockets.

Thermometers and other standard temperature-measuring devices are destroyed by heat of the exhaust flames, which may be as high as 4,000 degrees Fahrenheit. Sodium line reversal, another technique for the measurement of the temperature, by spectroscopic means, requires addition of special materials to the fuel and an observer in a dangerous position near the motor.

Donald H. Jacobs of the aerophysics laboratory of North American Aviation, Inc., explained that his new pyrometer measures the temperature of the exhaust gases with an accuracy of one percent.

Two beams of light reaching a photoelectric cell are used in the instrument. One beam passes through the exhaust flame of the rocket, while the other reaches the photoelectric cell through a series of mirrors. Comparing these beams of light, scientists can calculate the temperature of the exhaust gases.

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AGRICULTURE

Cornstalks Yield Sugar

Inbred corn, known as Connecticut 103, may open up a vast new source of sugar since its stalk has about 11% sugar in it and it produces good ears of corn.

➤ SUGAR from cornstalks may open up a vast new source of sugar in America's cornbelt if a corn plant developed at the Connecticut Agricultural Experiment Station is grown.

The new sugar-producing cornstalk is on a corn inbred known as Connecticut 103. It produces good ears of corn. The wood-like stalk has more than 11% sugar in it.

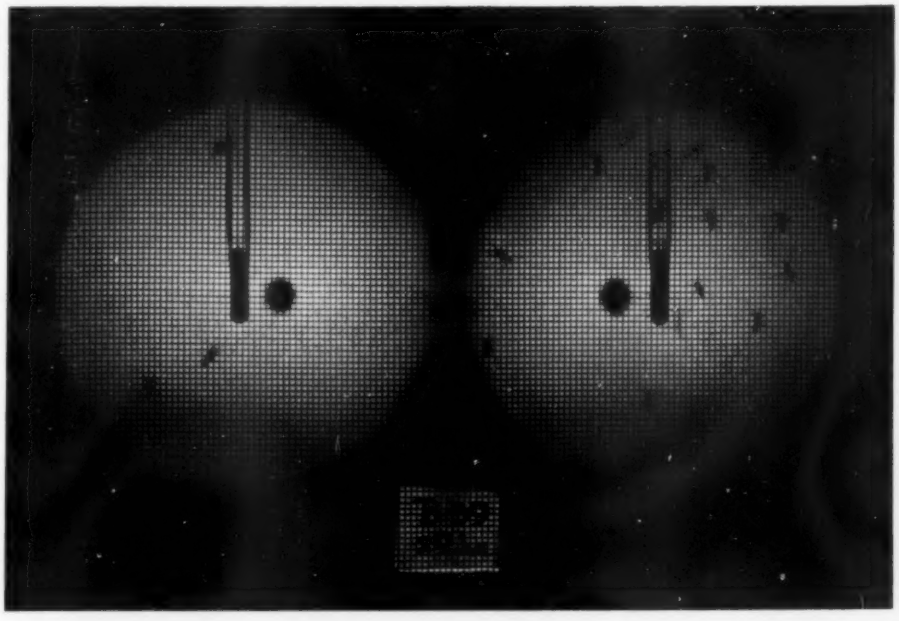
Stalks of 103 were found to be sweet by Dr. W. Ralph Singleton, geneticist at the station. He made chemical analyses which revealed 8.65% sucrose, or natural sugar, plus more than 2% of other sugars. The natural sugar content of sugar cane varies from 10% to 15%.

Scientists have known for a long time that cornstalks contain sugar, but stalks have never been considered a potential competitor to sugar cane. If the ears are removed before they mature, the stalk contains more sugar than normally. But this loses the ears of corn, main product of the corn plant.

Now, Dr. Singleton believes that it may be possible for the farmer to have his ears of corn and get sugar from the stalks after the ears are picked.

Today's corn sugar and corn syrup are not natural sugar. They are made chemically by converting the starch in kernels of corn into sugar.

At Beltsville, Md., scientists of the U. S. Department of Agriculture said that they were not familiar with his work. They suggested that the increased sugar content of the cornstalks might make the stalks better feed for the animals which normally eat the fodder made from them.



***MOSQUITOES CAN SMELL**—Females of the yellow fever mosquito responding to the odor of a man's arm at the right of an insect olfactometer. In both sections the temperature, humidity, rate of air flow and extraneous odors were practically the same but the odor of a man's arm was added to the right side. This is the first of 10 pictures exposed at one minute intervals that comprise one test. Submitted by Dr. Edwin R. Willis, of the Ohio State University, it won first prize in the black and white section for scientific photography.*

Dr. Singleton plans to continue his corn study next season. He suggests that sweet-stalk corn might be introduced into commercial field-corn hybrids. If it is, harvesting and processing problems would have to be solved before a new supply of sugar from cornstalks would be available.

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METEOROLOGY

Supercooled Cloud Needed To Produce Rain or Snow

➤ "RAINMAKING" is not as simple as it sounds. "Producing snow or rain artificially constitutes something more than merely dropping dry-ice out of an airplane," cautions Vincent J. Schaefer, General Electric scientist who originated the cloud-seeding method.

First job in producing rain or snow is finding the right cloud. If you drop dry-ice on just any cloud, it may rain or snow. But more times than not, nothing will happen. The cloud must contain moisture which is liquid despite the fact that the temperature is below freezing.

These clouds, called "supercooled," can be spotted by the appearance of icing on the plane, by measuring the temperature or by other optical effects.

The scientist revealed that some earlier attempts at rain production over a forest fire area failed because the clouds were not supercooled.

When you have spotted a likely cloud, dumping dry-ice out of a plane will not make either rain or snow. Mr. Schaefer calls his method "seeding." This distributes small bits of dry-ice over the cloud. If you toss a big chunk of dry ice out of a plane into a cloud it will probably drop right through the cloud without so much as a light shower or snow flurry.

Recommended recipe for seeding a cloud is about one pound of dry-ice per mile and a half of cloud.

Even with the proper seeding of a supercooled cloud, no welcome precipitation may reach the earth. If the atmosphere is too dry below the cloud, rain or snow may evaporate before they hit the ground.

If nature is cooperative and you follow the directions, you may get rain. But don't expect a cloudburst. A cloud two miles thick with a minimum supercooled portion at least 500 feet thick will only produce .14 of an inch of rain or 1.5 inches snow.

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DENTISTRY

Dentist Suggests Formula To Check Tooth Decay

➤ A 3-3-3 formula for checking tooth decay has been developed by Dr. Chester J. Henschel, New York dentist. The formula is:

No eating between meals. Cleanse teeth for three minutes three times a day within three minutes after eating.

For the cleansing he advises a tooth powder containing carbamide, di-ammonium hydrogen phosphate, bentonite, sodium lauryl sulfoacetate, precipitated calcium carbonate, saccharin and methyl salicylate.

The first two ingredients are probably the most important, since the carbamide acts to prevent acid formation and the phosphate liberates ammonia which apparently is effective in checking tooth decay. The importance of ammonia comes from studies showing that persons who are immune to tooth decay have more ammonia in their saliva than persons susceptible to decay.

Following the 3-3-3 formula is "strict and difficult," and the ammonia-generating tooth powder is not a panacea, Dr. Henschel admitted in reporting it to the Tufts College Study Club. With "average cooperation and use" the artificial immunity to tooth decay created by the ammonium compounds may only amount to from 5% to 25%. But patients are encouraged by the pleasant-tasting, cleansing and potentially remedial tooth powder to spend more time cleansing their teeth.

Encouragement for using this new kind of tooth powder which promises to do more than merely clean the teeth is found, Dr. Henschel pointed out, in recent action of the American Dental Association. That organization has abandoned its former policy of rejecting any tooth powder or paste that claimed treatment or remedial properties and has admitted the probability that some acceptable ones are or soon will be available.

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DENTISTRY

Discover Small Amount of Citric Acid in Saliva

➤ IF anyone calls you a "sourmug", be not over-hasty with your retort discourteous. You are one—slightly at any rate—if you are physiologically normal. Citric acid, the stuff that makes lemons sour, is present in human saliva, though in very low concentration.

Dr. Isadore Zipkin of the National Institute of Health has measured the citric acid concentrations in 180 saliva specimens contributed by 15 men, who chewed wads of paraffin to insure adequate production. (*Science*, Oct. 17.) The concentrations were very low, ranging from less than four to slightly over 20 parts of citric acid per million parts of saliva. The same individual showed considerable variation during the day, with highest concentration usually around noon.

Although salivary citric acid is small in amount, it may be potent in the mischief it can cause, Dr. Zipkin points out. Combining with the calcium of the teeth to form a highly soluble compound, it may play a considerable role in the production of dental caries.

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PLANT PHYSIOLOGY

Radioactivity Produces Changes in Plant Cells

➤ CHANGES in the developing male sex cells of plants have been produced for the first time with radioactive phosphorus taken up in water absorbed by the plants, in experiments carried out by Dr. Norman H. Giles, Jr., Yale University botanist. They may open the way to a new technique for producing evolutionary changes, and they definitely suggest caution in handling plants to which radioactive elements are being fed as part of their mineral ration. (*Proceedings of the National Academy of Sciences, Oct.*)

The plants used were a species of spiderwort—plants of open, sunny, moist places, with grass-like leaves and rather small, three-petaled blue flowers. Stems with groups of buds were cut off and placed in water containing a dissolved salt of radioactive phosphorus. They were inserted through holes in lead shields, to make sure that radiations direct from the solution did not reach the buds.

At intervals, buds were opened, and the cells that would have developed into pollen grains were examined under the microscope. Changes were evident in the chromosomes, or heredity-bearing structures, of a substantial number of the cells, the percentage of the total increasing with the length of time the stems had been absorbing the radioactive phosphorus.

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IN SCIEN

METEOROLOGY-AERONAUTICS

New Instruments Measure Visibility in Fog

➤ HOW far the normal eye can see in fogs of varying densities can now be measured by a new instrument developed by the National Bureau of Standards. It is a visibility-measuring device called a transmissometer, designed for use at airports to decrease the human factor in visual estimates of distance.

The instrument has another important possible use in aviation. It is expected that it can be employed to control high-intensity airport approach lights, and also to control fog-dispersal equipment, such as the British FIDO system, by which fog is lifted by the heat from burning troughs of oil.

The transmissometer consists of a light transmitter, a photo-tube receiver, an amplifier and an indicator. The light transmitter and receiver are separated by a distance sometimes as great as 4,000 feet. The amount of light that reaches the receiver is determined by the fog density or other atmospheric conditions in a direct line between the two pieces of equipment. The light falling on the photo-tube in the receiver sets up an electronic circuit whose output is an electric current that varies exactly as the amount of light received.

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ORNITHOLOGY

Birds That Shine at Night Reported by Observers

➤ BIRDS that shine in the dark with a phosphorescent light like that given off by some fish and other sea creatures, are the near-incredible rarity reported by Dr. W. L. McAtee of the U. S. Fish and Wildlife Service. He has gathered the statements of a considerable number of reliable observers, who declare that they have seen the phenomena in such diverse birds as barn-owls, night-herons and Australian finches.

Dr. McAtee has not yet been able to discover what causes the light, but he suspects it comes from luminous bacteria or fungi eaten by the birds or attached to their tissues.

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E FIELDS

CHEMISTRY

New Product Makes Jelly On Addition of Water

➤ JELLY without fuss or muss is promised to the housewife in U. S. patent 2,429,660, just issued to Alexander M. Zenzes of New York. In its finished form his preparation is a caked granular powder, which only requires the addition of water and flavoring, or of fruit juice instead. It doesn't even need to be boiled.

To prepare it, a thick sugar syrup is made up, and pectin added. Pectin is the stuff that makes jelly jell; it is prepared commercially from good but unmarketable fruit. After the pectin addition the syrup is re-concentrated; then tartaric acid or some other food acid is added.

As finally simmered down, the product consists of sugar crystals, each surrounded with a film containing sugar, pectin and food acid, plus about 10% of water. Its most convenient marketable form is as blocks or bricks, which need only to be dissolved in water and let stand a little while to make firm jelly.

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SAFETY

Two-Minute Firefighters Cut Toll in Air Crashes

➤ "TWO-MINUTE MEN", who form rescue crews which aim at removing air crash victims from burning planes in two minutes, are saving lives in both military and civilian air accidents, the Navy reported.

Using fog-foam firefighting equipment, the crews are being trained to rescue all persons in crashed planes at naval air fields within two minutes of the crash. In a recent crash of a Pan-American Airways transport at Floyd Bennett Field, New York City, a Navy crew controlled the flames to permit 41 passengers and crew members to escape unhurt, the Navy said.

When a plane crashes, trucks bring Navy firefighting and rescue equipment to the plane. Fog-foam equipment is used in three different ways to control the fire. If there is no fire at the moment of the crash, a water spray is used to cool the air to prevent combustion. If a fire is burning, a heavy foam generated with water and a mechanical foam compound are sprayed to smother flame. In some cases both the foam and cooling spray are used.

Streams of low-pressure fog-foam are used on the center of the flame, with low-pressure foam and carbon dioxide on the outer edges.

A path is cleared for rescuers who enter the cockpit and cabin with special tools.

Latest Navy crash equipment includes the model FFN-5 truck, which carries 800 gallons of water and 80 gallons of mechanical foam compound. As much as 4,000 gallons of foam can be sprayed on a fire in one minute with this equipment.

Science News Letter, November 8, 1947

SAFETY

Fog-Foam Used to Fight Fire on Navy Ships

➤ FOG-FOAM firefighting systems are being installed on a number of Navy aircraft carriers and firefighting tugs. They are expected to reduce greatly the danger from gasoline fires aboard ships.

Gasoline fires are hard to extinguish by ordinary firefighting methods. The use of fog-foam, instead of water, has been found successful. The foam is a smothering mass of snowy bubbles which lasts for hours and can be spread several inches thick by use of special nozzles to seal inflammable gases and keep oxygen out.

This mechanical foam is made from soybeans, fish scales and iron salts. It is carried aboard ship in special containers but is mixed with water in use. Its adhesive qualities make it stick to anything; a gale will not blow it away, and it can be laid in dikes to confine a gasoline fire.

A special nozzle developed for the Navy can be adjusted to throw a solid stream or to send the water through jets to produce a fine mist-like spray. The advantages of fog lie in its superior heat absorption, its use of small quantities of water, protection of firefighters from heat, and reduced water damage.

A further use of mechanical foam is in fighting above-the-ground oil tank fires. The foam is pumped into the tank through the oil pumping line itself at the bottom of the tank, rises through the oil, cools the oil below ignition temperature, and kills the fire. In this application the foam cools rather than smothers the fire.

Science News Letter, November 8, 1947

GENETICS

X-Rays Alter Heredity of Dried, Inactive Bacteria

➤ EVOLUTIONARY changes have been produced by X-rays in bacteria that were in a dried, inactive state, a three-man research team at the Hannah Dairy Research Institute in Kirkhill, Scotland, report in the science journal, *Nature*, (Oct. 11) published in London. Hitherto such hereditary changes induced by X-rays have been in organisms that were fully alive and functioning at the time of exposure.

The bacteria used in the experiment were isolated from some dried milk; they belong to the species technically known as *Bacterium aerogenes*. Among the hereditary changes induced were differences from the parent strain in the kinds of food substances they were able to use. The X-ray treatment apparently altered in some way the production and use of certain enzymes or digestive ferments.

Science News Letter, November 8, 1947

ZOOLOGY

Chimps Have Keener Sense of Smell than Man

➤ CHIMPANZEES have a keener sense of smell than man. This finding, contrary to previously held scientific opinion, is reported by Thomas M. Blackman of Honolulu. (*American Journal of Physical Anthropology*).

Failure to take into account the chimpanzee's intelligence has misled previous observers into believing the chimp lacked a sense of smell.

When a chimpanzee pays no attention to an odor, it is because it is familiar to him and he takes it for granted, just as a man would, Mr. Blackman observes. But an unknown odor, even if too faint for a man to detect, will arouse the chimpanzee's fear.

His own three chimps refused to sleep on blankets that had been dried near a peculiar kind of paint, because the blankets had absorbed the odor of the paint. But they did not detect oranges hidden for the first time in their cages, because they were familiar with the orange odor. Similar observations over a period of five and one-half years have convinced Mr. Blackman that the intelligence of chimpanzees must be taken into account in studying them.

Science News Letter, November 8, 1947

METEOROLOGY

Unmanned Weather Stations

Experimental ground-stations and balloons are being used to report weather automatically. Land-based units are able to operate some two months without attention.

By A. C. MONAHAN

See Front Cover

➤ AUTOMATIC weather reports will serve weather bureaus of the future with up-to-the-minute data for use in weather forecasting. They will come from thousands of isolated and widely separated stations from the Arctic to the Antarctic.

They will provide information from weather-breeding regions from which no reports are now received. They will need no attending crew. Reports will go on the air at regular intervals in radio code.

A few such stations are already in use experimentally, both in frigid and tropical climates. Their usefulness has been proven. Maintenance crews visit them every two months or so. Their reports are sent without further help from man, and they are given at the intervals for which the mechanism is set.

First Operating Model

The U. S. Weather Bureau, the National Bureau of Standards, the Army and the Navy have all had a part in their development. They are war-products, one might say, but work on them was started as early as 1935 by the National Bureau of Standards, under sponsorship of the Navy. The first operating model was completed in 1941 by the Bendix Aviation Corporation at Towson, Md., and several were placed in operation in the Pacific area the next year.

The United States is particularly interested in frequent reliable weather reports from stations along the Arctic Circle from the western Aleutian islands, across Alaska and northern Canada, Baffin island and Greenland. It is along this stretch that many storms breed that effect future weather in the north Pacific, continental United States, and air and surface shipping routes to Europe.

In developing these automatic reporting stations, lessons were taken from radiosonde. This method of obtaining weather data from high above the earth's surface, particularly for the benefit of aviators, is about a decade old. It, however, did not come into extensive use until during the war. It is now used regularly by the Weather Bureau, the Army and the Navy, the information obtained being interchanged.

In radiosonde, battery-operated electrical observation and radio-reporting instruments are carried high into the atmosphere by small balloons. Reports of temperature, humidity and pressure are sent almost constantly by radio code. The five-foot balloon ordinarily used expands in the decreasing atmospheric pressure as it rises, and is more than double that size at two miles or so up, when it bursts.

The instruments fall slowly to earth with the help of a parachute, and are frequently lost, but the observations are not lost because they were automatically recorded, as sent, on ground-based receivers.

Battery power is sufficient for the operation of the instruments in radiosonde equipment because the time in the air is relatively short. For the land-based stations, designed to operate some two months without attention, electric generators driven by gasoline engines are required. In addition to operating the various instruments and sending out powerful radio waves on the air to carry their reports, the engines are often needed for heating. The mechanisms used might fail to work in below-zero weather.

Special Housing

One essential in these land-based weather stations is their special housing. The eight-foot square building used must have a solid foundation to hold it in place in Arctic gales and tropical hurricanes, and also to provide an almost vibrationless setting for good instrument functioning. It must be well insulated against weather extremes, and automatically ventilated for instrument protection.

The generator set used gives both direct and alternating electric current. The first is used with the instruments, the second develops 115 volts and is primarily for the radio transmitter. An automatic clock is used to start the engine when needed. It starts the engine at the exact time when observations are to be taken and the instrument readings put on the air, much as the electric timer on a kitchen stove turns on the heat. The weight-driven clock is re-wound electrically when the generator set is in operation. A temperature control starts the engine when extreme cold makes it necessary.

A circuit selector set in the equipment ranks next to the generator in importance. It is composed of a number of synchronous motors so wired as to insert precision resistors into the keying relay of the radio transmitter. The resistors represent the actual recording shown by the meteorological instruments. These instruments are similar to those used in any weather observatory. They include a barometer, thermometer, humidity indicator, wind vane, wind velocity indicator and a rain gage.

Radio Antennae

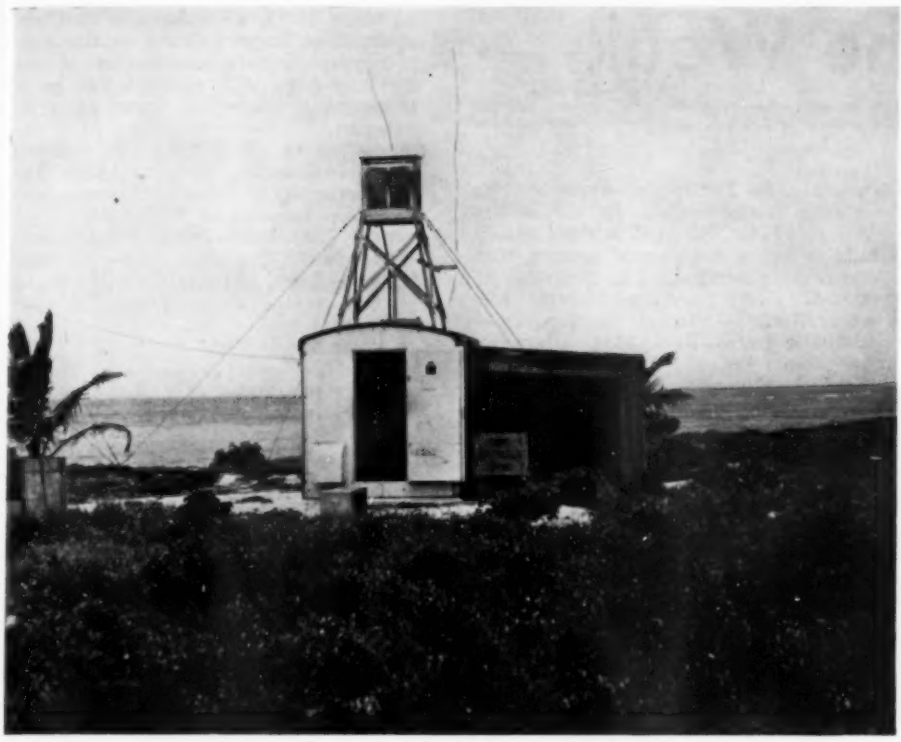
Two radio antennae stretch between two radio masts, 40 feet high and 75 feet apart. These masts must be strong to withstand all sorts of weather conditions, and positioned to provide projection in the particular direction desired. One difficult problem is securing good propagation from any particular locality in spite of terrain or other interference. Installations have to be "tailor-made" for the conditions existing at each station.

An assembly of instruments, including a vane, anemometer, and other wind equipment shown on the cover of this week's SCIENCE NEWS LETTER, are mounted on top of the radio mast.

The ideal set by scientists for weather reporting from the Arctic Circle is one station in every 300-mile stretch from the Aleutians to Greenland. Some would be manned, but many would be automatic. These latter will need servicing every two months and a supply of gasoline for fuel. Reaching them in some locations will be a dog-sled matter, at least until they can be reached by airplane or helicopter.

A typical station has an 80-gallon gasoline tank. Somewhat over half its content is used in a 60-day period under ordinary conditions. In cold weather, when heating is required, consumption is considerably greater. The amount consumed depends also upon the frequency of reports. For this reason, particularly hard-to-reach stations will report only at six-hour intervals.

How electrical readings are made with



AUTOMATIC WEATHER REPORTING—This shows a typical unmanned station used by the Department of the Navy. Electric generators driven by gasoline engines allow it to operate some two months without attention.

meteorological instruments is not a complicated matter. In the radiosonde, for instance, the electric hydrometer used contains a lithium chloride material that absorbs moisture. The higher the humidity, the greater the amount of electricity it transmits.

The temperature is measured by a ceramics resistor. As it gets colder, fewer electrons flow through the resistor. A diaphragm, which contracts and expands with the pressure of the surrounding air, measures atmospheric pressure. The diaphragm as it moves makes a changing electrical contact.

Weather forecasting for days ahead, as well as for 24-hour forecasting, needs constant information from many strategically-placed reporting stations. Some of these are great ocean regions where there is no land for land-based stations.

The weather over the Pacific far offshore from the continent affects the Pacific coast. Conditions over the Atlantic east of Florida must be known by pilots taking off for transoceanic flights. In these, and other areas, airborne weather-reporting stations are now in use.

Westward daily flights circling over the Pacific from California to Alaska by Department of the Air Force planes are reporting hourly the conditions encountered. Daily flights in the Bermuda-Florida and the West Indies region are reporting Atlantic conditions.

An adapted automatic station, similar to those used on land can be used on these planes. It would probably furnish a better system than the one used now by some planes on which readings are taken by crew members, and the data transmitted to shore bases by radio.

Weather reports are international in interest. Some day, through international cooperation, thousands of automatic and other stations will cover the world—for the benefit of all.

Science News Letter, November 8, 1947

GENERAL SCIENCE

Small Navy Force Returns To Map Antarctic Area

➤ A SMALL Navy expedition of two ships and approximately 450 men will leave this month for the Antarctic to continue some of the projects begun by last year's large task force into the southern polar continent.

Two icebreakers, the USS Edisto and the USS Burton Island, will make the long voyage south with a party of military and civilian scientists. The Edisto will leave an East Coast port, probably Norfolk, Va., early this month, while the other icebreaker will depart from San Pedro, Calif., about Nov. 20. The vessels will meet at Samoa early in December before proceeding to the Antarctic.

Chief job of the expedition will be to continue the mapping of the least-known continent. This will include further study of the Antarctic "oases", discovered early this year by the 1947 expedition.

The first postwar Navy venture into the Antarctic, which sailed less than a year ago, was the greatest in history. Four thousand men and a dozen ships comprised the task force which was commanded by Rear Adm. Richard H. Cruzen, now senior member of the Naval Review and Clemency Board.

Lt. (jg) R. G. Thompson of the Navy's Hydrographic Office will head a group of civilian and military scientists who will conduct mapping work on the expedition.

The ships will head into the Ross Sea and visit the famous base of retired Rear Adm. Richard E. Byrd, Little America. At Little America a check-up will be made on weather and time effects on equipment left there last year.

The expedition will be in the Antarctic for that continent's summer, our winter months.

Science News Letter, November 8, 1947

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ANNUAL REPORT OF THE SMITHSONIAN INSTITUTION, 1946—*Govt. Printing,* 440 p., illus., $2.25. With Appendix.

A.S.T.M. STANDARDS ON COAL AND COKE—*Am. Soc. for Testing Materials,* 159 p., illus., paper, $2.00, includes papers on sampling methods, chemical analysis, testing methods, specifications and classifications and definitions of terms.

ATMOSPHERIC POLLUTION—W. C. L. Hemeon and T. F. Hatch—*Mellon Inst.,* 4 p., illus., paper. Free from: Industrial Hygiene Foundation, Mellon Institute, Pittsburgh, Pa.

THE ATOM BOMB AND THE ARMED SERVICES—Bernard Brodie and Eilene Galloway—*Legislative Reference Service, Library of Congress,* 17 p., paper, available to libraries only. Free from: Library of Congress, Washington, D. C.

BASIC BOTANY—Fred W. Emerson—*Blakiston,* 372 p., illus., $4.00. For beginning college students, this text emphasizes the scientific method of problem solution.

BENJAMIN SILLMAN: Pathfinder in American Science—John F. Fulton and Elizabath H. Thomson—*Schuman,* 294 p., illus., $4.00. A biography of this famous geologist, chemist, and educator, who became "the father of American scientific education."

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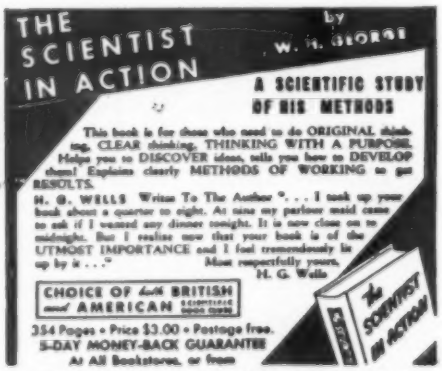
CATALOGUE OF TYPE SPECIMENS OF MAMMALE IN CHICAGO NATURAL HISTORY MUSEUM—Colin Campbell Sanborn—*Chicago Natural History Museum,* Fieldiana: Zoology, Vol. 32, No. 4, 293 p., paper, $1.00.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THE FERNS OF NEW JERSEY—Mintin A. Chrysler and J. L. Edwards—*Rutgers Univ. Press* 201 p., illus., $4.00.

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MEN OUT OF ASIA—Harold Sterling Gladwin—*Whittlesey House,* 390 p., illus., $4.00. Where the American Indians came from and how their culture evolved.

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PRINCIPLES OF CHEMISTRY—Joel H. Hildebrand—*Macmillan,* 5th ed., 446 p., illus., $4.25. New edition of a text for college students.

PSYCHOLOGICAL TESTING—James L. Mursell—*Longmans,* 449 p., $4.00. A textbook on the theory and use of mental tests with analysis of typical tests and an exhaustive bibliography; a knowledge of basic statistics is assumed.

THE PUBLIC SPEAKER'S TREASURE CHEST—Herbert V. Prochnow—*Harper,* 414 p., $3.50.

PUBLICATIONS OF THE NATIONAL FOUNDATION FOR INFANTILE PARALYSIS—Publication No. 48, one double sheet, free. Available from 120 Broadway, New York 5, N. Y. An annotated bibliography, listing free literature and visual aids available on loan.

REBUILDING THE WORLD ECONOMY—Norman S. Buchanan and Friedrich A. Lutz—*Twentieth Century Fund,* 434 p., $3.50. A compendium on the history of world trade and its present status, the urgent need for, and obstacles thwarting, a redevelopment of world trade, and presenting a program of specific means toward reconstruction of multilateral trade.

RESEARCH: A Journal of Science and Its Applications — *Butterworth's Scientific Publications, Ltd.,* Vol. I, No. 1, 48 p., illus., paper $10.00 per year. The first issue of a magazine devoted to both pure science and its practical applications. Available from: 4, 5, 6, Bell Yard, Temple Bar, London, W.C.2, England.

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SUNSPOTS IN ACTION—Harlan True Stetson—*Ronald*, 252 p., $3.50. Information from various fields of science is here brought together, with emphasis upon the sun's effect on the atmosphere of the earth; factual evidence regarding sunspots is set forth, and the author also examines critically certain hypotheses concerning the earth's relationship to its cosmic environment.

SURVEY OF EXISTING INFORMATION AND DATA ON RADIO NOISE OVER THE FREQUENCY RANGE 1-30 Mc/s— H. A. Thomas and R. E. Burgess—*His Majesty's Stationery Office*, Department of Scientific and Industrial Research, Radio Research Special Report 15, 126 p., illus., paper, 60 cents. Available from: His Majesty's Stationery Office, London, England.

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A TRIP THROUGH MELLON INSTITUTE—*Mellon Institute*, 4th ed., 20 p., illus, paper. History of the Institute's Fellowship system and a tour of its physical plant. Free from: Mellon Institute, Pittsburgh, Pa.

UNDERSTANDING YOURSELF AND YOUR SOCIETY—John M. Ewing—*Macmillan*, illus., 357 p., illus., $2.25. For high school seniors, this book on individual and social psychology and sociology is non-technical, practical, and refreshingly-written.

UNITED STATES ARMY IN WORLD WAR II: The Army Ground Forces—The Organization of Ground Combat Troops—Kent Roberts Greenfield, Robert R. Palmer, and Bell I. Wiley — *Govt. Printing*, 540 p., $3.25. Issued by the Historical Division, Department of the Army, this is the first in a long series of volumes documenting World War II, and describes the mobilization and preparation for combat of the ground army.

WAX AND FATTY BYPRODUCTS FROM SUGARCANE—Royal T. Balch—*Sugar Research Found.*, Technological Report Series No. 3, 62 p., paper. Sugar cane is analyzed for other useful products which may be extracted from it. Free from: 52 Wall St., New York 5, N. Y.

WEATHER HORIZONS—Frances Day Ashley, *American Meteorological Society*, 79 p., paper. A series of articles discussing various types of careers in meteorology, and the factors influencing them. Free from: 5 Joy St., Boston 8, Mass.

WHAT YOU CAN DO FOR HIGH BLOOD PRESSURE—Peter J. Steincrohn—*Doubleday*, 191 p., $2.50. Written for the layman, this book gives valuable information concerning the symptoms and treatment of high blood pressure, with suggestions for the hypertensive's adjustment to a new way of life.

WIND TUNNEL TESTING—Alan Pope—*Wiley*, 319 p., illus., $5.00. This first thorough study in the field presents data concerning all types of wind tunnels.

WORD FINDER—J. I. Rodale—*Rodale Press*, 1317 p., $6.50. Planned as an aid to the writer, this work assists in effective sentence structure by supplying associative modifying and action words.

Science News Letter, November 8, 1947

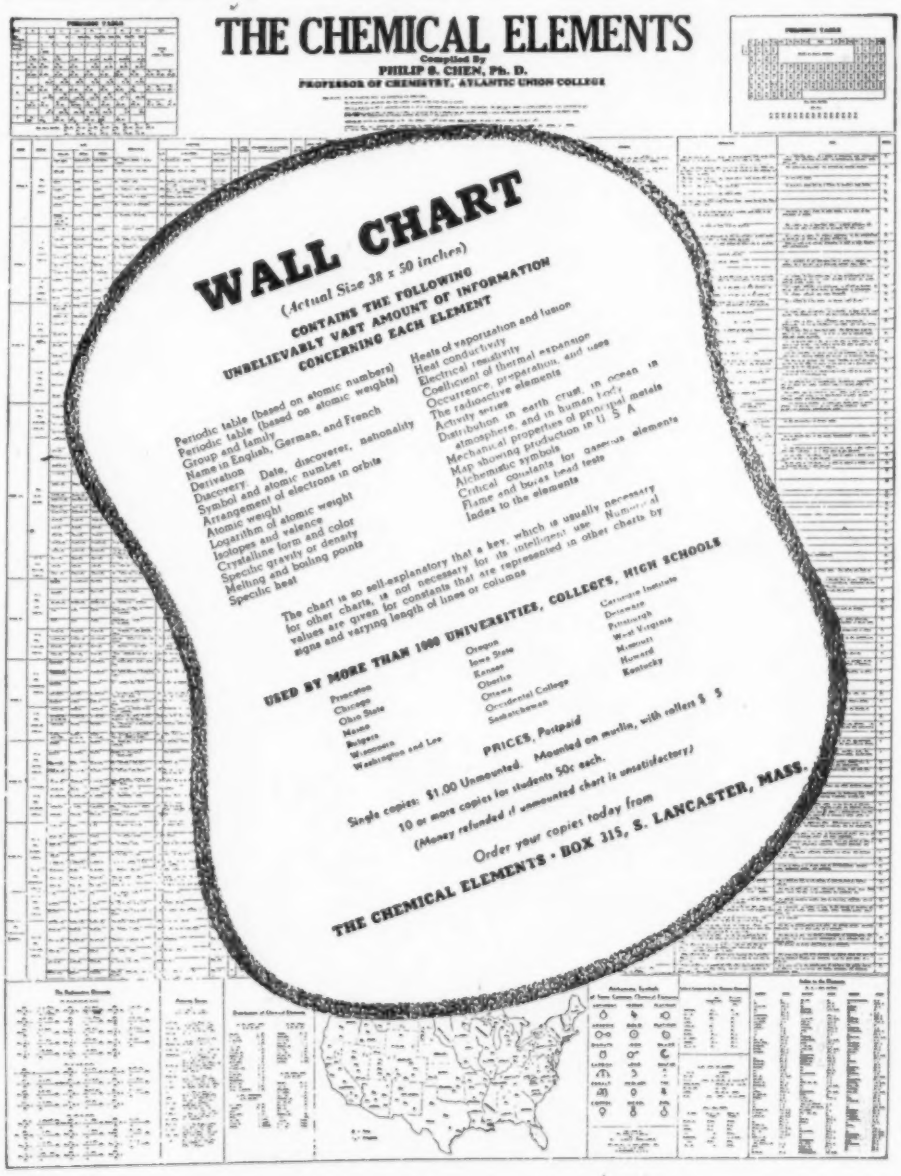
PSYCHOLOGY

Mentally Ill See Less Motion in Still Pictures

➤ ORDINARILY it is the mentally ill person who sees things that are not there. But when it comes to seeing people dancing, running, or moving about in a still picture, the normal person is better.

In fact, a test based on this ability to see figures in motion on cards of varying shading and contours, can be used to distinguish between normal and abnormal individuals. Drs. Joseph Zubin, David M. Levy, and Ralph Rust, of the New York Psychiatric Institute, have reported to the American Psychological Association.

Science News Letter, November 8, 1947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Compiled By
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PROFESSOR OF CHEMISTRY, ATLANTIC UNION COLLEGE
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❁ *PORTABLE PUMP, for farm use or draining flooded cellars, has aluminum castings which make it so light that one man can easily carry it where needed. It is operated by a built-in gasoline engine with its cylinders, piston, crankcase and flywheel fan of aluminum alloy.*

Science News Letter, November 8, 1947

❁ *POCKET electrical tester consists of an insulated sprocket around which is wound six feet of test wire, with one end of the test cord terminating in a standard base plug, the other in two test prods. One of these contains a test lamp. It is for use in testing all sorts of electrical appliances.*

Science News Letter, November 8, 1947

❁ *BULLET TRAP, a safety device for gun practice, is a box-like device of metal with a removable cardboard or plywood target on its front. The steel sides slope inward toward the rear where there are two 10-gauge steel sheets. The construction is so designed that the bullets are pulverized.*

Science News Letter, November 8, 1947

❁ *ELECTRIC COOLER for bottled water, for use where piped water is not available or where spring water is used, is a 15-inch square cabinet about four and a half feet high which has an enameled top to hold the inverted bottle. The condensing compartment is easily reached through a front panel.*

Science News Letter, November 8, 1947

❁ *INDUSTRIAL microscope, for uses ranging from drilling tiny holes to assembling miniature radio and radar tubes, gives the magnified image right side up, rather than inverted, thus making it easier for the operator. It can be used on a table, or bolted to a machine through a hole in its base.*

Science News Letter, November 8, 1947

❁ *STRENGTH tester, 100 pounds capacity, will handle the tensile strength of rope, cord, fibers and wire up to one-eighth inch in diameter and the compression strength of metals, rubber, fiberboard and plastics. It is a compact instrument that can be held in one hand while operated.*

Science News Letter, November 8, 1947

❁ *AIR-STORAGE tank, about 15 inches long and seven in diameter, is carried in the automobile and used to inflate a flat tire on the road. The light tank, with hose to connect to the tire valve, can be refilled like an ordinary tire at the free-air pump of a service station.*

Science News Letter, November 8, 1947

❁ *RUBBER STRIPS, to form bevels and decorative grooves on concrete surfaces, are attached to the forms instead of the conventional wood strips. They are held in position by a waterproof adhesive, but can be easily removed without chipping the mortar.*

Science News Letter, November 8, 1947

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Question Box

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DENTISTRY

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GENETICS

What happened to a shrine that contained the foundation-stones of modern genetics? p. 292.

MEDICINE

How can mice help man fight tuberculosis? p. 293.

What new streptomycin-like remedy has been discovered in soil? p. 291

MEDICINE-GENETICS

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NUCLEAR PHYSICS

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SAFETY

How does fog-foam fight fire? p. 297.

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